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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/901,109	07/10/2001	Ravindranath Droopad	210136US99	7228

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EXAMINER
STEIN, STEPHEN J

ART UNIT	PAPER NUMBER
1775	2

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/901,109	Droopad et al.
Examiner	**Art Unit**
Stephen Stein	1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a).. In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-114* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-14, 17-23, 26-43, 46-51, 54, 56, 57, 60-68, 71-79, 82, 83, 87-99,* 102-107, 111 and 112 is/are rejected.

7) ☒ Claim(s) *15, 16, 24, 25, 44, 45, 52, 53, 55, 58, 59, 69, 70, 80, 81, 84-86, 100,* 101, 108-110, 113 and 114 is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4-6, 8, 9, 22, 26, 33, 34, 35, 37, 38, 54, 62, 79, 89-91, 93, 94 and 111 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 4-6, 8, 9, 22, 26, 33, 34, 35, 37, 38, 54, 62, 79, 89-91, 93, 94 and 111 are indefinite because they improperly claim in the alternative. See MPEP 2173.05(h).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-14, 17-23, 27-43, 46-51, 56, 57, 60-68, 71-79, 81-83, 87-99, 102-107 and 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,392,257 (Ramdani et al.) in view of US Patent 5,603,764 (Matsuda et al.).

Ramdani teaches a semiconductor structure including a monocrystalline 300 mm diameter silicon wafer substrate, an amorphous interface layer, an accommodating buffer layer

of monocrystalline SBT, $SrZrO_3$, $BaZrO_3$, $SrHfO_3$, $BaSnO_3$ or $BaHfO_3$ and has a thickness of 2 - 100 nm, and a monocrystalline compound semiconductor material such as a GaAs, GaAlAs, InP, CDS, CdHgTe, ZnSE and ZnSSe having a thickness of 1 nm to 100 μm (col 4, lines 1-68 and col. 5, lines 19-34). Ramdani further teaches a template layer between the accommodating buffer layer and the monocrystalline compound semiconductor layer where the template layer may comprise 1-10 monolayers of Zr-As, Hf-S, HfP, Sr-O-As, Sr-O-P, Ba-O-As, Im-Sr-O, or Ba-O-P and in another example 1-10 monolayers of Zn-O followed by 1-2 monolayers of excess zinc with selenidation on the surface of the zinc (col. 5, lines 35-68). The reference further teaches a the template layer acts as a capping layer, and that following the formation of the template gallium is introduced and gallium arsenide forms or alternatively, gallium (cap inducing material) can be deposited on the capping layer to form a Sr-O-Ga bond and then As is introduced with the gallium to form GaAs (col. 9, lines 18-35). Ramdani still further teaches in another embodiment and additional monocrystalline oxide layer (88) and a second group III-V compound semiconductor layer over on the first monocrystalline compound semiconductor layer (See Figure 5 and col. 11, lines 50-68 and col. 12, lines 1-15). The reference finally teaches that the process of forming the layers may include CVD, MOCVD, MEE, ALE or the like (col. 9, lines 50-58).

Ramdani is silent with regard to the compound semiconductor layer on the template layer being oxygen doped.

Matsuda discloses a process for growth of a III-V group compound semiconductor layer and further teaches that by doping with oxygen a deep level of the dopant is formed in the crystal is formed and a the crystal layer of high electric resistance can be grown (col. 1. lines 35-40) and further teaches that when a AlGaAs compound semiconductor layer without high electric resistance is used the FET characteristics are inferior. (col. 7, lines 60-63).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to dope the compound semiconductor layers with oxygen in order to form a highly electrically resistant compound semiconductor layer in order to improve the FET characteristics.

Allowable Subject Matter

5. Claims 15, 16, 24-25, 44-45, 52-53, 55, 58, 59, 69, 70, 80, 81, 84-86, 100, 101, 108-110, 113 and 114 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. Claims 26, 54 and 111 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter: .

8. The prior art fails to teach or suggest that the template layer comprises a zintl-type phase material, or an additional oxygen doped buffer layer between the accommodating buffer layer

and the monocrystalline oxygen doped material layer. The prior art further fails to teach or disclose heat treating the monocrystalline oxide buffer layer to form an amorphous layer or either maintaining a constant oxygen concentration or varying the oxygen concentration along the layers.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is (703) 305-0583. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones be reached by dialing (703) 308-3822.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group Receptionist whose phone number is (703) 308-0661. The fax phone number for this group is (703) 872-9310 for non-final responses and (703) 872-9311 for after final responses.

July 9, 2002

Stephen J. Stein

DEBORAH JONES

SUPERV